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« Financial Openness, Aggregate Consumption, and Threshold Effects »

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Financial openness, aggregate consumption, and threshold effects

Ouverture financière, consommation agrégée, et effets de seuil

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Abstract. We analyze the influence of financial openness on the level of aggregate consumption. We construct a complete and balanced panel dataset of 88 countries for the period 1980-2010, and then differentiate between four groups of countries. Models for non stationary heterogeneous panels, as well as panel threshold regression models, are used to estimate the determinants of aggregate consumption. The core finding of the paper is that the financial openness effect on consumption changes in the course of economic development, with the level or per capita income acting as a threshold which is consistently estimated within the model. The openness effect is non homogeneous across groups, stronger for low levels of per capita income, and diminishes as income rises, providing novel insights about the welfare effect of financial liberalization.

Keywords. Financial openness · Aggregate consumption · Dynamic panel threshold model.

JEL classification. C33 · E21 · E44 · F32.

Résumé. Nous analysons l'influence de l'ouverture financière sur le niveau de la consommation agrégée. Nous construisons un panel complet et équilibré de 88 pays au cours de la période 1980-2010. Les déterminants de la consommation agrégée sont estimés au moyen de modèles pour panels hétérogènes non-stationnaires, ainsi qu'à l'aide de modèles de panel à effets de seuil. Le résultat central est que l'effet de l'ouverture financière sur la consommation change au cours du développement économique, le niveau de revenu par tête jouant un rôle de seuil. Ce seuil est estimé de manière consistante par la modèle. L'effet de l'ouverture financière varie en fonction des groupes de pays, est plus fort pour de faibles niveaux de revenu par tête, et diminue quand le revenu augmente. Cela apporte de nouveaux éléments de connaissance de l'impact de la libéralisation financière sur le bien-être.

Mots-clés. Ouverture financière · Consommation agrégée · Modèles dynamiques de panel à effets de seuil.

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1. Introduction

The world economy has experienced a rapid development of financial integration from the mid-1980s, and many developing countries opened to capital inflow in anticipation of its benefits in terms of a more efficient capital allocation and risk-sharing possibilities. However, this phenomenon made developing countries more vulnerable than industrial economies to the financial crises in the late 1980s and 1990s. This exacerbated the debate about the benefits and the adverse effects of financial globalization.

The literature has mainly investigated the effects of financial openness on growth and on output/consumption volatility growth, and its results are not always fully conclusive. In theory, financial globalization should enhance economic growth by an increase of investments. This effect should be stronger for developing countries which are relatively capital scarce. The empirical literature is however unable to find robust results on the growth benefits of financial globalization. This controversial may depend on different factors (see Kose et al., 2009 for a complete review of the literature), as the chosen measure of financial openness, the time horizon, the microeconomic or macroeconomic level of the analysis, the econometric methodology. Nevertheless, the main effects of financial integration on growth may be indirect. First, as argued by Kose et al. (2009), financial openness has also a number of collateral benefits like financial markets development, policy discipline, better governance and institutional quality such that its positive effects for developing countries are not immediately visible in the short run. Second, in order for a country to benefit from financial integration, it may exists a certain threshold of financial and institutional development and economic features that an economy needs to attain. This is investigated by Kose et al. (2011), who find that there are clearly identifiable levels of financial depth and institutional quality such that a country can benefit from financial globalization only once these threshold conditions are satisfied.

From the volatility side,[1] liberalization, allowing poor countries to differentiate with respect to their agricultural and natural resource based productions, should reduce output volatility at earlier stages of development, and increase it at more advanced levels, since it exposes emerging countries to industry-specific shocks. Moreover, financial integration should reduce consumption volatility by allowing international risk-sharing. Again, the empirical literature does not confirm the theoretical predictions. First, there is little support that financial globalization increases countries vulnerability to crises.[2] Second, the literature agrees on a declining trend of macroeconomic volatility starting in the mid-1980s, but also find that during the 1990s consumption volatility of emerging economies rises more than output volatil-

[1] See Kose et al. (2009) for an extensive review of the literature.

[2] For example, Glick et al. (2006) conclude that less capital control reduces the probability of experiencing a crisis, and Edwards (2005) does not find systematic evidence that financial liberalization leads to crises.

ity in response to an increase in capital liberalization. However, the theoretical results seem to be supported at higher levels of integrations.[3]

Surprisingly, the effect of financial openness on the level of consumption has never been investigated by the empirical literature. To our knowledge, this paper is the first attempt to analyze the effect of financial liberalization on the level of consumption. This gives us new insights about the effect of financial liberalization on welfare and living standards. Only the theoretical literature has analyzed the influence of capital liberalization on consumption and the results are inconclusive. In this literature, welfare can be decomposed into the sum of a short-term component, the level of consumption, and a long-term part, the growth rate. Gourinchas and Jeanne (2006) build a neoclassical growth model where current consumption increases and the growth rate slows down as the country moves from autarky to financial integration. Antràs and Caballero (2010) show that short run and long run consumption may either increase or decrease when a country integrates, and growth vanishes in the long run. Finally, Boucekkine et al. (2013) analyze the welfare changes in a model of endogenous growth with and without investment commitment, where financial openness is growth enhancing. They find that the switch of the economy from autarky to financial integration occurs at the expense of a smaller initial consumption. However, if the growth rate is larger than the international interest rate, the positive growth effect dominates the negative level effect on consumption and the economy experiences welfare gains, so as financial integration is good for welfare only if the country is endowed with growth-enhancing institutions (high quality governance and efficient financial markets).

This paper attempts to analyze the effect of financial liberalization on consumption on a panel of 88 countries over the period 1980-2010. We estimate the determinants of aggregate consumption, including financial openness. Countries are grouped into four regions, namely Organisation for Economic Co-operation and Development (OECD), Sub-Saharan Africa (SSA), Middle-East, North Africa and Asia (MENAA) and Latin America and Caribbean (LAC). We employ dynamic models for non stationary panels developed by Pesaran and Smith (1995) and Pesaran et al. (1999) to take into account the non-stationary nature of the time series. We argue that the effect of financial openness on consumption might change depending on the level of GDP per capita experienced by a country, meaning that the effect of financial openness on consumption is likely to be an indirect one. We thus investigate the interaction of financial openness with income to see whether the level of GDP influences the marginal effects of financial globalization on consumption. The results confirm our intuition, that is, the effect of financial liberalization is likely to decrease and become negative with GDP per capita for OECD and SSA countries. However, the effect is increasing with GDP for MENAA economies, while the results for LAC countries are not significant. Hence, there exists a GDP threshold for OECD and SSA countries such that, for smaller income levels, financial openness has a positive

[3]See Kose et al. (2003).

impact on consumption, while for higher income levels the effect becomes negative.

In order to thoroughly assess this new finding, we combine dynamic models for non stationary panels with the panel threshold regression model developed by Hansen (1999). This methodology allows us to endogenously estimate the threshold level and to test whether the threshold is statistically significant and the non-linear specification validated. The panel threshold regressions confirm our results.

The paper is structured as follows. Section 2 presents the data the descriptive statistics. The econometric methodology is contained in Section 3. The results are shown in Section 4 and discussed in Section 5. Finally, Section 6 concludes.

2. Data

We construct a complete and balanced panel dataset of 88 countries for 31 years, from 1980 to 2010. Countries are divided into four groups (OECD, SSA, MENAA and LAC) for which the effect of financial liberalization might be expected to differ.[4] As is typical in the literature, we do not include Central and East European transition economies because of the concerns regarding the reliability of their pre-transition data. The list of countries and the variable definitions and sources are reported in the appendix (Table A1 and Table A2 respectively).

We use stock data from the "External Wealth of Nations" database (Lane and Milesi-Ferretti, 2007) to measure the degree of financial liberalization of each country for each year. The financial openness variable is constructed as the sum of total stocks of external assets and liabilities divided by GDP. As argued in Kose et al. (2011), this measure of *de facto* financial openness is a summary measure of a country's total exposure to international financial markets. As this measure takes into account actual capital flows, we argue that it is a more reliable proxy for capital account openness than *de jure* measures, for which openness is only defined in terms of legal status, that is, the presence or absence of restrictions to capital account transactions. Figure 1 shows average trends of financial liberalization for the four groups of countries over the observation period. We can see that the country groups are quite

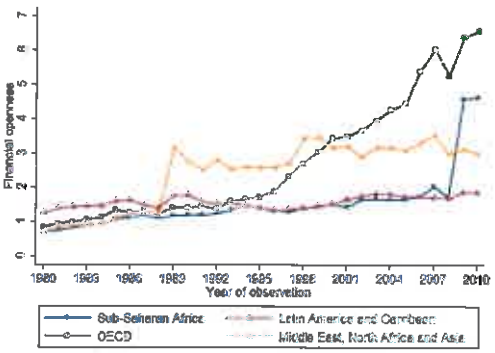


Figure 1 – Trends in financial openness over the observation period

[4]Grouping countries by region also avoids to choose an a priori income threshold (as it happens when the sample is split into developed and developing countries), given that the employed methodology performs an endogenous sample splitting based on GDP per capita.

different with regard to their pattern of capital account liberalization.

A stationarity test has been performed on each variable used in the analysis.[5] We choose to employ the Harris-Tzavalis test for stationarity (Harris and Tzavalis, 1999), which is suited to strongly balanced panel data. The null hypothesis that all the panels contain a unit root has to be rejected for the inflation rate only, meaning that all the other variables are not stationary.

Descriptive statistics of the variables used in the analyses are given in the appendix (Table A3), as well as the cross-correlation matrix (Table A4). The simple correlation between consumption and financial openness is 0.25. The methodology employed in the study to explore the effect of financial openness on consumption is presented in the next section.

3. Econometric methodology

The econometric methodology is illustrated herein. We are concerned with a panel where both N (countries) and T (years) are large. When the time horizon is short, econometric models can be estimated using the random effect or the fixed effect estimator, instrumental variables, or the generalized method of moment of Arellano and Bond (1991). Pesaran and Smith (1995) show that these methods can produce inconsistent and misleading estimations when time horizon is large. Moreover, the assumption of slope coefficients homogeneity and stationarity of time series may be restrictive. Pesaran and Smith (1995) and Pesaran et al. (1999) propose two techniques to estimate nonstationary dynamic panels in which the parameters are heterogeneous across groups, in the case where both country and time dimensions are large and of the same magnitude. They show that a modification of the standard econometric techniques cited above can lead to efficient estimates of the long-run slopes, which are valid either if the variables of interest are I(0) or I(1). Two different procedures can be used. On the one hand, it is possible to estimate one equation for each country and then average the coefficients. This is the Mean Group (MG) estimator. However, this estimator does not take into account the possible homogeneity across group of certain coefficients. Alternatively, one can combine pooling and averaging. This is the Pooled Mean Group estimator (PMG), which allows short-run coefficients, error variance and intercept to vary across countries, while the long-run slopes are constrained to be the same. There are different reasons that can justify this last assumption, such as countries may be subject to the same solvency constraints, common technology and arbitrage conditions. Finally, one can use the Dynamic Fixed Effect estimator (DFE), which allows only intercepts to be different across countries. If the long-run coefficients are equal across countries, then the PMG estimator will be consistent and efficient, whereas the MG estimator will only be consistent. If, on the other hand, the long-run coefficients are not equal across countries, then the PMG estimator will be inconsistent, whereas the MG estimator will still provide a consistent estimate of the

[5]The results are not shown here but are available from the authors upon request

mean of long-run coefficients across countries. The long-run homogeneity restriction of slopes can be tested by performing a Hausman (1978)-type test, which compares the long-run coefficients of the MG and PMG estimators.

The long-run consumption function is specified as follows:[6]

$$c_{it} = \theta_{0i} + \theta_{1i} y_{it} + \theta_{2i} \pi_{it} + \theta_{3i} e_{it} + \theta_{4i} FO_{it} + u_{it}, \quad i = 1, ..., N \quad t = 1, ..., T \tag{1}$$

where c_{it} is logarithm of real per capita consumption, y_{it} is logarithm of real per capita GDP, π_{it} is the inflation rate, e_{it} is the real exchange rate and FO_{it} financial openness. Since all variables except inflation are I(1), the error term u_{it} is I(0) for all i. The ARDL(1,1,1,1,1) specification of Equation (1) is:

$$\begin{aligned} c_{it} = {} & \mu_i + \delta_{10i} y_{it} + \delta_{11i} y_{it-1} + \delta_{20i} \pi_{it} + \delta_{21i} \pi_{it-1} + \delta_{30i} e_{it} + \delta_{31i} e_{it-1} \\ & + \delta_{40i} FO_{it} + \delta_{41i} FO_{it-1} + \lambda_i c_{it-1} + \epsilon_{it} \end{aligned} \tag{2}$$

and the error correction equation, which will be referred to as Model (1), is written as:

$$\begin{aligned} \Delta c_{it} = {} & \phi_i \left(c_{it-1} - \theta_{0i} - \theta_{1i} y_{it} - \theta_{2i} \pi_{it} - \theta_{3i} e_{it} - \theta_{4i} FO_{it} \right) \\ & - \delta_{11i} \Delta y_{it} - \delta_{21i} \Delta \pi_{it} - \delta_{31i} \Delta e_{it} - \delta_{41i} \Delta FO_{it} + \epsilon_{it} \end{aligned} \tag{3}$$

with $\theta_{0i} = \frac{\mu_i}{1-\lambda_i}$, $\theta_{1i} = \frac{\delta_{10i}+\delta_{11i}}{1-\lambda_i}$, $\theta_{2i} = \frac{\delta_{20i}+\delta_{21i}}{1-\lambda_i}$, $\theta_{3i} = \frac{\delta_{30i}+\delta_{31i}}{1-\lambda_i}$, $\theta_{4i} = \frac{\delta_{40i}+\delta_{41i}}{1-\lambda_i}$ and $\phi_i = -(1-\lambda_i)$. By including the coefficient θ_{0i} , we allow for a non-zero mean cointegration relationship. If there exists a cointegration relationship, the error correction speed, ϕ_i, should be significantly different from zero and negative if the variables return to their long-run equilibrium.

In order to test if the level of GDP affects the marginal effect of financial openness on consumption, we estimate Equation (3) by adding a linear interaction between financial openness and GDP, which will be referred to as Model (2):[7]

$$\begin{aligned} \Delta c_{it} = {} & \phi_i \left(c_{it-1} - \theta_{0i} - \theta_{1i} y_{it} - \theta_{2i} \pi_{it} - \theta_{3i} e_{it} - \theta_{4i} FO_{it} - \theta_{5i} FO_{it} y_{it} \right) \\ & - \delta_{11i} \Delta y_{it} - \delta_{21i} \Delta \pi_{it} - \delta_{31i} \Delta e_{it} - \delta_{41i} \Delta FO_{it} + \epsilon_{it} \end{aligned} \tag{4}$$

where $\theta_{5i} = \frac{\delta_{50i}}{1-\lambda_i}$.

The use of linear interaction to call for a potential threshold effect may seem arbitrary. Therefore, we propose to reach this qualitative result by implementing the

[6]Similar specifications have been estimated by Davidson et al. (1978) and Haque and Montiel (1989) for a sample of OECD and developing countries respectively.

[7]We also test a quadratic interaction, but the coefficient estimates for the quadratic term are not significant (the results are not shown here but are available from the authors upon request).

panel threshold regression (PTR) model proposed by Hansen (1999; 2000).[8] This methodology allows to estimate endogenously the threshold and to test whether the threshold effect is statistically significant and the non-linear specification validated. The threshold regression model, namely Model (3), is written as:

$$\begin{aligned}\Delta c_{it} = \phi_i(c_{it-1} - \theta_{0i} - \theta_{1i}y_{it} - \theta_{2i}\pi_{it} - \theta_{3i}e_{it} - \theta'_{4i}FO_{it}\boldsymbol{I}(y_{it} \leq \gamma) \\ - \theta''_{4i}FO_{it}\boldsymbol{I}(y_{it} > \gamma)) - \delta_{11i}\Delta y_{it} - \delta_{21i}\Delta\pi_{it} - \delta_{31i}\Delta e_{it} - \delta_{41i}\Delta FO_{it} + \epsilon_{it}\end{aligned} \tag{5}$$

where $\boldsymbol{I}(.)$ is the indicator function. In (5) the slopes of the other control variables are constrained to remain invariant.[9] In line with this specification, observations are split into two classes and respond to two regression functions, which differ for the slope of financial openness, that is, if GDP is smaller than the threshold, the coefficient of financial liberalization is θ'_{4i}, otherwise it is equal to θ''_{4i}.

Then the threshold parameter γ can be estimated in order to minimize the sum of the squared errors. In practice, we use a grid-search algorithm which limits the search to specific quantiles, provided that a minimal percentage of observation lies in each regime (Hansen 1999; 2000).

The final issue is to test the statistical significance of the estimated threshold. Since it is not identified under the null hypothesis of no threshold, Hansen (1999; 2000) proposes a residual-based block bootstrap procedure to test the null hypothesis and to obtain the asymptotic p-value.[10] For that purpose, the regression residuals, $\hat{\epsilon}_{it}$, are grouped by countries, $\hat{\epsilon}_i = (\hat{\epsilon}_{i1}, \hat{\epsilon}_{i2}, ..., \hat{\epsilon}_{iT})$. We draw, with replacement, a sample of size N from the empirical distribution $\{\hat{\epsilon}_1, \hat{\epsilon}_2, ..., \hat{\epsilon}_N\}$. This sample is used to create a bootstrap sample under the null hypothesis. The next step is to use this bootstrap sample to estimate Model (3) under the alternative and calculate the bootstrap value of the Wald statistic. The asymptotic p-value of the Wald statistic is obtained by repeating this procedure a large number of times in order to calculate the percentage of draws for which the simulated statistic exceeds the actual.

4. Results

We estimate Model (1), (2) and (3) separately for the four groups of countries. The results are displayed in Table 1 for OECD countries, Table 2 for SSA, Table 3 for MENAA and Table 4 for LAC.[11] In all specifications the coefficient on the

[8] This methodology can be applied to a dynamic framework (see for instance Hansen and Seo, 2002 or Dang et al., 2012).

[9] Actually, we tested the possibility of a change of all the parameters, and the results show that the two-regime model is valid only for the slope of financial openness.

[10] The null hypothesis is $\theta'_{4i} = \theta''_{4i}$.

[11] Note that we also estimate Model (1), (2) and (3) for the whole sample, and the results regarding the financial openness-consumption relationship were not significant. There thus seems to be no evidence for a homogeneous effect of capital account liberalization on consumption at the world level. The table is not presented here but is available from the authors upon request.

Table 1 – Results: OECD

	Model (1)			Model (2)			Model (3)		
	MG	PMG	DFE	MG	PMG	DFE	MG	PMG	DFE
Long-Run Coefficients									
GDP	0.885***	0.999***	0.957***	0.809***	0.945***	0.950***	0.974***	0.964***	0.953***
	(0.115)	(0.016)	(0.029)	(0.109)	(0.012)	(0.023)	(0.090)	(0.014)	(0.022)
Financial openness	-0.011	-0.010***	-0.004*	-1.005^{+}	0.254***	0.196***			
	(0.030)	(0.002)	(0.002)	(0.577)	(0.039)	(0.056)			
Financial openness * GDP				0.100^{+}	-0.025***	-0.019***			
				(0.058)	(0.004)	(0.005)			
Financial openness 1 (GDP $\leq \gamma$)							-0.061	0.008**	0.008*
							(0.045)	(0.002)	(0.003)
Financial openness 2 (GDP $> \gamma$)							-0.001	-0.007***	-0.005**
							(0.009)	(0.001)	(0.002)
Inflation rate	-0.005*	-0.000	-0.000	-0.006*	-0.000***	-0.000+	0.000	-0.000**	-.0000^{+}
	(0.002)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)
Real exchange rate	0.041	-0.019*	-0.017	0.034	-0.024***	-0.017	0.012	-0.008	-0.016
	(0.032)	(0.009)	(0.023)	(0.029)	(0.006)	(0.018)	(0.037)	(0.008)	(0.018)
Joint Hausman test									
h-test		5.58			3.44			6.82	
p-value		0.232			0.633			0.234	
Error-Correction Coefficients									
Phi	-0.419***	-0.182***	-0.133***	-0.437***	-0.217***	-0.168***	-0.446***	-0.208***	-0.175***
	(0.035)	(0.020)	(0.015)	(0.036)	(0.025)	(0.019)	(0.040)	(0.023)	(0.019)
Short-Run Coefficients									
Δ GDP	0.221***	0.433***	0.551***	0.209***	0.413***	0.523***	0.213***	0.412***	0.515***
	(0.049)	(0.044)	(0.026)	(0.046)	(0.039)	(0.027)	(0.048)	(0.045)	(0.028)
Δ Financial openness	0.001	0.003	0.001	0.000	0.001	-0.000	0.000	0.002	0.000
	(0.003)	(0.002)	(0.001)	(0.004)	(0.002)	(0.001)	(0.000)	(0.002)	(0.001)
Δ Inflation rate	-0.000	-0.001*	-0.000**	-0.000	-0.001*	-0.000*	-0.000	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Δ Real exchange rate	-0.005	-0.009	-0.018***	-0.005	-0.010	-0.018***	-0.005	-0.013*	-0.018***
	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)
Intercept	0.295^{+}	-0.054***	0.017	0.408*	0.045***	0.028	0.350*	0.004	0.024
	(0.161)	(0.008)	(0.039)	(0.200)	(0.005)	(0.039)	(0.162)	(0.004)	(0.039)
Threshold estimate							9.963	10.092	10.064
95% confidence interval							[9.596;10.436]	[9.596;10.436]	[9.596;10.436]
No. Observations, low regime							279	372	357
No. Observations, high regime							496	403	418
Test of threshold							2.262	45.065	17.840
Bootstrap *p*-value							0.100	0.087	0.001
No. Countries	25	25	25	25	25	25	25	25	25
No. Observations	750	750	750	750	750	750	750	750	750

NOTES: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. Estimators: Mean Group (MG), Pooled Mean Group (PMG). Dynamic Fixed Effect (DFE), controlling for country and time effects. Annual data: 1980-2010.

error-correction term (*Phi*) is significantly negative and falls in the range -0.109 to -0.540, thus revealing the existence of a long-run relationship across countries of the four groups. The average speed of adjustment estimates suggest different dynamics across groups, and in particular that SSA seems to experience a faster adjustment process to the long-run equilibrium. Note that, as in most applications of these panel error-correction estimators, the long-run coefficients are the ones of most interest.

Under long-run slope homogeneity, the MG estimator provides consistent but inefficient estimates of the mean of the long-run coefficients, while the pooled estimators are both consistent and efficient (Pesaran et al., 1999). The validity of the long-run homogeneity restrictions can be assessed using Hausman's specification test. A *p*-value greater than 0.05 would indicate that slope homogeneity holds. In view of the specification test results, the PMG estimator is efficient and is preferred over the

Table 2 – Results: SSA

	Model (1)			Model (2)			Model (3)		
	MG	PMG	DFE	MG	PMG	DFE	MG	PMG	DFE
Long-Run Coefficients									
GDP	0.853***	0.742***	0.896***	0.881***	0.988***	0.962***	0.986***	0.948***	0.950***
	(0.089)	(0.038)	(0.071)	(0.225)	(0.019)	(0.077)	(0.197)	(0.034)	(0.078)
Financial openness	-0.052	-0.093***	0.002	-0.125	0.473***	0.320*			
	(0.039)	(0.017)	(0.004)	(1.340)	(0.068)	(0.151)			
Financial openness * GDP				0.004	-0.051***	-0.035*			
				(0.184)	(0.007)	(0.016)			
Financial openness 1 (GDP $\leq \gamma$)							0.071	0.079***	0.069+
							(0.086)	(0.020)	(0.036)
Financial openness 2 (GDP $> \gamma$)							-0.0137	-0.000	0.001
							(0.050)	(0.001)	(0.004)
Inflation rate	-0.003	-0.000	-0.000	-0.003	-0.002**	-0.001	-0.003	-0.001	-0.001
	(0.002)	(0.000)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Real exchange rate	-0.073+	0.047***	0.015	-0.073	-0.053***	-0.014	-0.080+	0.006	-0.003
	(0.043)	(0.012)	(0.026)	(0.044)	(0.014)	(0.029)	(0.043)	(0.012)	(0.028)
Joint Hausman test									
h-test		6.88			1.08			6.34	
p-value		0.142			0.956			0.275	
Error-Correction Coefficients									
Phi	-0.487***	-0.267***	-0.209***	-0.540***	-0.255***	-0.210***	-0.487***	-0.248***	-0.206***
	(0.045)	(0.040)	(0.025)	(0.049)	(0.040)	(0.025)	(0.047)	(0.030)	(0.025)
Short-Run Coefficients									
Δ GDP	0.389***	0.536***	0.548***	0.378***	0.524***	0.564***	0.382***	0.498***	0.561***
	(0.086)	(0.090)	(0.052)	(0.090)	(0.102)	(0.052)	(0.085)	(0.088)	(0.052)
Δ Financial openness	-0.027*	-0.030**	-0.000	-0.023	-0.064***	-0.001	-0.028*	-0.057***	-0.000
	(0.012)	(0.010)	(0.002)	(0.015)	(0.011)	(0.002)	(0.012)	(0.010)	(0.002)
Δ Inflation rate	0.001	0.000	-0.000	0.001	0.000	-0.000	0.001	-0.000	-0.000
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Δ Real exchange rate	0.031+	0.009	-0.002	0.034*	0.034**	-0.001	0.030+	0.024+	-0.003
	(0.016)	(0.013)	(0.009)	(0.016)	(0.012)	(0.009)	(0.016)	(0.013)	(0.009)
Intercept	0.565	0.438***	0.089	0.472	-0.061***	-0.015	0.576	-0.002	0.005
	(0.347)	(0.071)	(0.112)	(0.950)	(0.015)	(0.122)	(0.366)	(0.012)	(0.120)
Threshold estimate							6.474	7.279	7.279
95% confidence interval							[6.401;8.771]	[6.401;8.771]	[6.401;8.771]
No. Observations, low regime							123	417	417
No. Observations, high regime							559	265	265
Test of threshold							2.394	16.224	3.477
Bootstrap p-value							0.143	0.085	0.093
No. Countries	22	22	22	22	22	22	22	22	22
No. Observations	660	660	660	660	660	660	660	660	660

NOTES: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. Estimators: Mean Group (MG), Pooled Mean Group (PMG), Dynamic Fixed Effect (DFE), controlling for country and time effects. Annual data: 1980-2010.

MG estimator for the three models and the four country groups. The results from the PMG model will thus be emphasized herein, along with the quite similar results obtained with the DFE model.

Covariates other than financial openness are included in the regressions in order to control for their influence on aggregate consumption; yet their analysis is not the main focus of this paper. The estimated coefficients are nonetheless consistent with theoretical considerations and other related empirical studies on the determinants of consumption at the macro level (see for instance Pesaran et al., 1999). Not surprisingly, we find that real per capita income exerts an overwhelming influence on aggregate consumption across all country groups and specifications. The estimated long-run inflation elasticity has the expected negative sign for OECD and SSA countries, yet the significance of the estimated coefficients is much higher for OECD

Table 3 – Results: MENAA

	Model (1)			Model (2)			Model (3)		
	MG	PMG	DFE	MG	PMG	DFE	MG	PMG	DFE
Long-Run Coefficients									
GDP	1.196*	1.152***	1.099***	1.975^{+}	1.144***	1.112***	0.946	0.977***	0.992***
	(0.548)	(0.043)	(0.101)	(1.185)	(0.041)	(0.109)	(0.616)	(0.028)	(0.100)
Financial openness	0.106	-0.058*	-0.011	9.548	-0.282**	0.037			
	(0.148)	(0.025)	(0.007)	(11.282)	(0.103)	(0.143)			
Financial openness * GDP				-1.086	0.026*	-0.005			
				(1.346)	(0.010)	(0.014)			
Financial openness 1 (GDP $\leq \gamma$)							0.165	-0.070**	-0.207**
							(0.147)	(0.026)	(0.076)
Financial openness 2 (GDP $> \gamma$)							0.079	-0.024	-0.009
							(0.169)	(0.022)	(0.007)
Inflation rate	-0.010	0.008***	0.007^{+}	-0.003	0.008***	0.007^{+}	-0.015	0.003*	0.006
	(0.018)	(0.002)	(0.004)	(0.007)	(0.002)	(0.004)	(0.019)	(0.001)	(0.004)
Real exchange rate	-0.104	-0.021	0.055	-0.006	-0.011	0.052	-0.280	0.007	0.051
	(0.071)	(0.017)	(0.046)	(0.077)	(0.018)	(0.047)	(0.191)	(0.011)	(0.045)
Joint Hausman test									
h-test		5.01			7.16			5.35	
p-value		0.287			0.209			0.374	
Error-Correction Coefficients									
Phi	-0.329***	-0.141***	-0.130***	-0.440***	-0.139***	-0.130***	-0.342***	-0.183***	-0.133***
	(0.069)	(0.035)	(0.022)	(0.066)	(0.036)	(0.022)	(0.066)	(0.041)	(0.022)
Short-Run Coefficients									
Δ GDP	0.296**	0.561***	0.583***	0.266**	0.563***	0.582***	0.296**	0.527***	0.588***
	(0.090)	(0.069)	(0.058)	(0.086)	(0.070)	(0.058)	(0.088)	(0.061)	(0.057)
Δ Financial openness	-0.041^{+}	-0.033	0.003*	-0.040^{+}	-0.032	0.003*	-0.037	-0.037	0.003*
	(0.023)	(0.028)	(0.002)	(0.022)	(0.028)	(0.002)	(0.024)	(0.028)	(0.002)
Δ Inflation rate	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Δ Real exchange rate	0.028	0.035	0.043***	0.007	0.035	0.043***	0.027	0.030	0.041***
	(0.018)	(0.022)	(0.011)	(0.026)	(0.021)	(0.011)	(0.019)	(0.023)	(0.011)
Intercept	0.224	-0.195***	-0.175^{+}	0.792	-0.181***	-0.190^{+}	0.338	-0.021*	-0.056
	(0.409)	(0.044)	(0.098)	(0.866)	(0.045)	(0.107)	(0.449)	(0.009)	(0.107)
Threshold estimate							8.700	7.840	7.705
95% confidence interval							[7.400;8.928]	[7.400;8.928]	[7.400;8.928]
No. Observations, low regime							466	213	171
No. Observations, high regime							123	376	418
Test of threshold							0.249	4.946	6.735
Bootstrap p-value							0.733	0.307	.021
No. Countries	19	19	19	19	19	19	19	19	19
No. Observations	570	570	570	570	570	570	570	570	570

NOTES: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. Estimators: Mean Group (MG), Pooled Mean Group (PMG), Dynamic Fixed Effect (DFE), controlling for country and time effects. Annual data: 1980-2010.

than for SSA countries. The sign is however positive for MENAA and LAC countries. Finally, the real exchange rate seems to have an ambiguous effect on aggregate consumption.

We now turn to the analysis of the results regarding the relationship between financial openness and consumption. We first present the results for Model (1). The results obtained with the PMG estimator suggest that the overall long-run effect of financial openness on aggregate consumption is negative and significant for OECD, SSA and MENAA countries. The coefficient on financial openness declines in significance when using the DFE estimator, yet its sign and magnitude remain unchanged. No significant effect is found for LAC countries.

To gain more understanding about the relationship between financial openness and consumption, we also investigate whether the openness effect changes with per

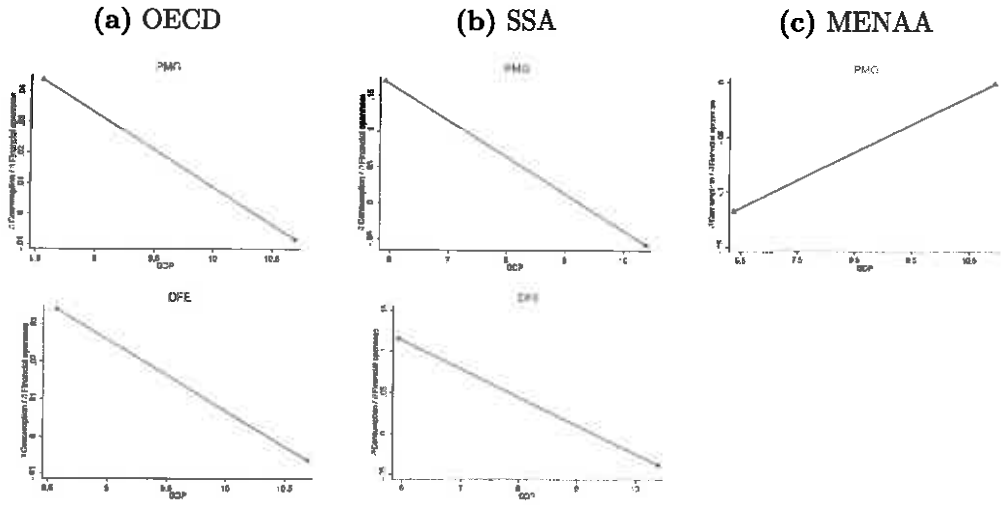
Table 4 – Results: LAC

	Model (1)			Model (2)			Model (3)		
	MG	PMG	DFE	MG	PMG	DFE	MG	PMG	DFE
Long-Run Coefficients									
GDP	1.873*	1.126***	1.001***	2.073*	1.074***	1.068***	1.182**	0.914***	0.964***
	(0.756)	(0.054)	(0.081)	(0.914)	(0.072)	(0.106)	(0.435)	(0.034)	(0.103)
Financial openness	0.391	0.011	-0.001	5.151	0.229	0.285			
	(0.256)	(0.012)	(0.018)	(4.325)	(0.362)	(0.283)			
Financial openness * GDP				-0.520	-0.016	-0.034			
				(0.479)	(0.040)	(0.034)			
Financial openness 1 (GDP $\leq \gamma$)							0.404+	-0.059**	-0.002
							(0.241)	(0.020)	(0.017)
Financial openness 2 (GDP $> \gamma$)							0.578	-0.101***	0.016
							(0.400)	(0.021)	(0.035)
Inflation rate	-0.008	0.000*	0.000*	-0.001	0.000*	0.000	-0.003	0.000***	0.000+
	(0.007)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)
Real exchange rate	0.091	-0.122***	-0.049	0.018	-0.151***	-0.048	-0.108	0.025**	-0.053
	(0.176)	(0.024)	(0.040)	(0.075)	(0.021)	(0.040)	(0.136)	(0.009)	(0.040)
Joint Hausman test									
h-test		9.09			7.92			5.03	
p-value		0.059			0.161			0.412	
Error-Correction Coefficients									
Phi	-0.369***	-0.148***	-0.226***	-0.414***	-0.153***	-0.227***	-0.374***	-0.109**	-0.228***
	(0.061)	(0.032)	(0.027)	(0.066)	(0.032)	(0.027)	(0.062)	(0.037)	(0.027)
Short-Run Coefficients									
Δ GDP	0.420***	0.648***	0.840***	0.386***	0.662***	0.835***	0.430***	0.714***	0.842***
	(0.110)	(0.085)	(0.081)	(0.101)	(0.087)	(0.081)	(0.116)	(0.093)	(0.081)
Δ Financial openness	-0.015	-0.013	-0.014	-0.023	-0.017	-0.014	-0.017	0.003	-0.015
	(0.021)	(0.012)	(0.009)	(0.022)	(0.012)	(0.009)	(0.020)	(0.013)	(0.009)
Δ Inflation rate	-0.001	-0.001	-0.000	-0.001	-0.001	-0.000	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Δ Real exchange rate	-0.087	-0.016	0.017+	-0.060	-0.025	0.018+	-0.083	-0.030	0.017+
	(0.071)	(0.049)	(0.010)	(0.063)	(0.051)	(0.010)	(0.069)	(0.039)	(0.010)
Intercept	-0.378	-0.199***	-0.072	-1.118	-0.142***	-0.202	-0.077	0.044**	-0.000
	(0.391)	(0.045)	(0.164)	(0.971)	(0.033)	(0.208)	(0.352)	(0.014)	(0.208)
Threshold estimate							9.107	8.617	8.844
95% confidence interval							[8.123;9.196]	[8.123;9.196]	[8.123;9.196]
No. Observations, low regime							526	287	369
No. Observations, high regime							156	395	313
Test of threshold							1.023	10.269	0.322
Bootstrap p-value							0.388	0.283	0.615
No. Countries	22	22	22	22	22	22	22	22	22
No. Observations	660	660	660	660	660	660	660	660	660

NOTES: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. Estimators: Mean Group (MG), Pooled Mean Group (PMG), Dynamic Fixed Effect (DFE), controlling for country and time effects. Annual data: 1980-2010.

capita GDP. For that purpose, a financial openness-GDP interaction is investigated in Model (2). This allows us to test whether the effect of capital account liberalization on consumption is likely to change with a country's level of economic development. We find significant interaction terms for all country groups except LAC. Figure 2 shows the average marginal effects of financial openness on consumption for the country groups for which the interaction term is significant, namely OECD countries (Figure 2a), SSA (Figure 2b) and MENAA (Figure 2c). For OECD economies and SSA, we see that the effect of financial openness on consumption is initially positive but decreases with the level of economic development, eventually becoming negative at high levels of per capita income. This result holds when using both the PMG and DFE estimators. In contrast, the openness effect is initially negative for MENAA countries using the PMG estimator, and an upward trend is exhibited. The negative

Figure 2 – Marginal effect of financial openness on consumption given GDP



effect of financial openness on consumption is thus likely to decrease with the level of per capita income, ultimately tending to zero at high income levels.

Model (2) suggests that the openness effect is likely to change in the course of economic development. Everything seems to indicate that the level of per capita income acts as a threshold in the effect of financial openness on aggregate consumption. This result comes from the investigation of a linear interaction between financial openness and GDP. It may however appear arbitrary from a statistical viewpoint to obtain this result by imposing such interaction. In order to assess this finding more thoroughly, Model (3) proposes to combine models for non stationary heterogeneous panels, namely Model (1), with a panel threshold regression model. Model (3) allows us to properly test for the existence of a threshold effect in the relationship between financial openness and consumption. More specifically, the marginal effects on consumption of an increase in financial openness will be allowed to vary depending on whether GDP reaches a threshold level which is consistently estimated within the model.

The results from Model (3) largely confirm the aforementioned finding that the effect of financial openness on consumption changes with per capita income. For OECD countries, and using either the PMG or DFE estimator, the coefficients on financial openness before and after the GDP threshold has been reached are significant and respectively positive and negative. Moreover, the threshold estimates are found to be significant. Hence, the effect of financial openness on aggregate consumption is likely to be positive until a country reaches a certain income level, from which the openness effect eventually becomes negative. The estimated threshold values equal to 10.092 ($24149) for the PMG estimator and 10.064 ($23482) for the DFE estimator, which roughly correspond to the ones found with the linear interaction model,

namely Model (2), and shown in Figure 2a. Note also that the endogenous sample splitting procedure, described in the third section of this paper, results for the PMG (DFE) estimator in a sample of 372 (357) observations before the threshold value, and 403 (418) after. The results for SSA are qualitatively similar to those of OECD economies, except that the openness effect after the threshold has been reached is likely to be zero, and not negative. The estimated threshold values are significant and equal to 7.279 ($1450) for both the PMG and DFE estimators. For MENAA economies, our previous finding from Model (2) is confirmed, that is, the effect of financial openness on consumption is first negative and tend to be zero as per capita income rises. The estimated threshold values are significant for the DFE estimator only, for which it equals to 7.705 ($2219). This result suggests that, although the qualitative finding remains the same than for Model (2), the threshold is reached earlier than the estimated value shown in Figure 2c. Finally, no significant result regarding the effect of financial openness is found for LAC countries, in line with our previous findings.

5. Discussion

This study highlights the role that financial openness plays in determining changes in aggregate consumption patterns. The previous literature has exclusively investigated the effect of financial liberalization on consumption volatility, providing compelling findings about international risk sharing and consumption smoothing, while leaving the openness effect on the level of aggregate consumption unexplored. To our knowledge, this is the first paper which analyzes the financial openness-consumption nexus from an empirical viewpoint.

In view of the results, we find no evidence for a homogeneous effect of capital account liberalization on consumption at the world level. However, the existence of a long-run relationship across countries of the four groups is assessed, suggesting that each country group seems to experience a specific pattern of the financial openness-consumption relationship. The long-run effect of capital account liberalization on aggregate consumption is found to be negative for OECD, SSA and MENAA countries, while no significant effect is found for LAC countries.

Further understanding is gained by investigating a financial openness-GDP interaction which tests whether the openness effect changes with a country's level of income. For OECD economies and SSA, we find that the effect of financial openness on consumption is initially positive but decreases with the level of per capita GDP, eventually becoming negative at high income levels. In contrast, for MENAA countries the openness effect is initially negative but is likely to decrease with the level of per capita income, ultimately tending to zero at high income levels. These results suggest that the openness effect is likely to change in the course of economic development, indicating that the level of per capita income acts as a threshold in the effect of financial openness on aggregate consumption.

Finally, we investigate this threshold effect more thoroughly by combining models for non stationary heterogeneous panels with a panel threshold regression model. This allows us to assess the existence of a threshold in an endogenous manner. We show that the sign and magnitude of the relationship ultimately depends on a country's level of per capita income. For OECD economies, the effect of financial openness on aggregate consumption is likely to be positive until a certain income level is reached, from which the openness effect eventually becomes negative. The results for SSA are qualitatively similar, except that the openness effect after the threshold has been reached is likely to be zero, and not negative. For MENAA economies, the effect of financial openness on consumption is first negative and tend to be zero as per capita income rises.

Our results for OECD and SSA countries can be linked to the theoretical findings of Boucekkine et al. (2013), in which consumption falls when the economy switches from autarky to financial integration, even though a stronger growth is experienced at the same time. The authors argue that this may be due to two constraints faced by the newly integrated economy. First, the interest payment on debt diverts resources from consumption. Second, resources are further subtracted from consumption, as the only way to borrow more is to invest more because of credit restrictions. These mechanisms can also contribute to the understanding of our results for MENAA countries. The two aforementioned constraints are unlikely to be binding, since these economies are highly endowed with natural resources. Thus, interest payment and borrowing limits would not crowd consumption out.

Altogether, these results provide novel insights about the welfare effect of financial liberalization, as aggregate consumption is often used as a proxy for welfare. The openness effect is stronger for low levels of per capita income (either positive for OECD economies and SSA, or negative for MENAA), and diminishes as income rises. Financial openness is then likely to exert only a transient influence on consumption and, to a certain extent, on welfare.

Appendix.

Table A1 – List of countries

Sub-Saharan Africa	OECD	Latin America and Caribbean	Middle East, North Africa and Asia
Botswana	Australia	Argentina	Algeria
Burkina Faso	Austria	Belize	Bahrain
Burundi	Belgium	Bolivia	Egypt, Arab Rep.
Cameroon	Cyprus	Chile	Fiji
Central African Republic	Denmark	Costa Rica	India
Cote d'Ivoire	Finland	Dominica	Indonesia
Gabon	France	Dominican Republic	Jordan
Gambia, The	Germany	Ecuador	Malaysia
Ghana	Greece	Grenada	Nepal
Kenya	Iceland	Guatemala	Pakistan
Madagascar	Ireland	Honduras	Papua New Guinea
Malawi	Israel	Jamaica	Philippines
Mauritius	Italy	Nicaragua	Singapore
Niger	Japan	Panama	Solomon Islands
Nigeria	Korea, Republic of	Paraguay	Sri Lanka
Senegal	Malta	Peru	Syrian Arab Republic
Seychelles	Mexico	St. Lucia	Thailand
Sierra Leone	Netherlands	St. Vincent and the Grenadines	Tonga
South Africa	New Zealand	Suriname	Vanuatu
Sudan	Portugal	Trinidad and Tobago	
Swaziland	Spain	Uruguay	
Togo	Sweden	Venezuela	
	Switzerland		
	Turkey		
	United States		
22	25	22	19

Table A2 – Variable definitions and sources

Variables	Sources
Log of real per capita household consumption	PWT
Log of real per capita GDP	PWT
Annual CPI inflation rate	IFS
Real exchange rate	PWT
Gross de facto financial openness to GDP	Lane and Milesi-Ferretti (2007) (stock data) and WDI (current price US dollar GDP)

Notes: PWT: Penn World Tables (version 7.1); IFS: International Financial Statistics; WDI: World Development Indicators.

Table A3 – Descriptive statistics

	Mean	Standard deviation	Min	Max	N
Consumption					
Whole sample	8.272	1.158	5.764	10.394	88
Sub-Saharan Africa	7.101	0.886	5.764	9.685	22
OECD	9.627	0.422	8.137	10.394	25
Latin America and Caribbean	8.326	0.466	6.992	9.630	22
Middle East, North Africa and Asia	7.784	0.754	6.158	9.729	19
GDP					
Whole sample	8.650	1.231	5.921	10.930	88
Sub-Saharan Africa	7.411	1.049	5.921	10.383	22
OECD	10.012	0.443	8.557	10.692	25
Latin America and Caribbean	8.723	0.500	7.475	10.382	22
Middle East, North Africa and Asia	8.207	0.878	6.366	10.930	19
Inflation rate					
Whole sample	33.497	390.305	-11.686	11749.640	88
Sub-Saharan Africa	12.653	18.894	-11.686	178.700	22
OECD	9.332	24.165	-4.480	373.821	25
Latin America and Caribbean	104.243	776.058	-1.672	11749.640	22
Middle East, North Africa and Asia	7.512	6.786	-3.846	59.484	19
Real exchange rate					
Whole sample	1.758	0.718	0.151	7.661	88
Sub-Saharan Africa	1.814	0.558	0.151	3.500	22
OECD	1.165	0.343	0.585	3.017	25
Latin America and Caribbean	2.035	0.705	0.188	7.661	22
Middle East, North Africa and Asia	2.154	0.764	0.847	5.446	19
FO					
Whole sample	2.070	3.643	0.163	75.659	88
Sub-Saharan Africa	1.529	4.100	0.236	75.659	22
OECD	2.709	3.378	0.281	33.341	25
Latin America and Caribbean	1.575	1.450	0.266	13.253	22
Middle East, North Africa and Asia	2.429	4.830	0.163	36.354	19

Table A4 – Cross-correlation matrix

	Consumption	GDP	Inflation rate	Real exchange rate	FO
Consumption	1				
GDP	0.982	1			
Inflation rate	-0.038	-0.036	1		
Real exchange rate	-0.419	-0.420	0.037	1	
FO	0.245	0.274	0.022	-0.166	1

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